DO NOT OPEN THIS TEST BOOKLET TILL YOU ARE ASKED TO DO SO

TR/DLTI/ETC/P-II/17

Test Booklet Series

TEST BOOKLET
GENERAL ABILITY TEST
(PART– II)
(Electronics & Telecommunication Engineering)

(Signature of the Candidate)

(Invigilator's Signature)

Time Allowed : 1 hour 30 minutes (One hour thirty minutes) **Maximum Marks : 60**

INSTRUCTIONS

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE SCREENING TEST, YOU SHOULD CHECK THAT THIS TEST BOOKLET DOES NOT HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
2. **ENCODE CLEARLY THE TEST BOOKLET SERIES IN THE APPROPRIATE PLACE IN THE ANSWER SHEET BY BLACK BALL POINT PEN ONLY.**
3. This Test Booklet contains 60 items (questions). Each question, carrying 1 (one) mark only, has four responses (answers). You will select the response which you want to mark on the Answer Sheet. In case you feel that there is more than one correct response, mark the response which you consider the most appropriate. In any case, choose ONLY ONE response for each item.
4. You have to mark all your responses by **Black Ball Point Pen only** on the separate Answer Sheet provided. See directions in the Answer Sheet.
5. All items carry equal marks.
6. Before you proceed to mark in the Answer Sheet the responses to various items in the Test Booklet, you have to fill in some particulars in the Answer Sheet.
7. After you have completed filling in responses on the Answer Sheet and the Screening Test is completed, you should handover the Answer Sheet to the Invigilator only. You are permitted to take the Test Booklet with you.
8. Sheets for rough work are appended on the Test Booklet at the end.
9. **Penalty for wrong answers :**
   (a) There will be four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **one-third** of the marks assigned to that question will be deducted as penalty.
   (b) If a candidate gives more than one answer, it will be treated as a **Wrong Answer** even if one of the given answers happens to be correct and there will be same penalty as above to that question.
   (c) If a question is left blank, i.e. no answer is given by the candidate, there will be **no penalty** for that question.

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Four options are given against each of the following questions. Select the best/correct option from among the four options and encode in the answer sheet by using **Black Ball Point Pen** only as per example given below :

Example : The capital of India is

(A) Delhi ● New Delhi

(C) Indraprastha (D) None of these

1. A discrete time signal $x[n] = \sin(\pi^2 n)$, n being an integer is

   (A) periodic with period π

   (B) periodic with period π^2

   (C) periodic with period $\frac{\pi}{2}$

   (D) not periodic

2. If $A \oplus B = 0$ then

   (A) $A \neq B$

   (B) $A = 0$

   (C) $B = 0$

   (D) $A = B$

3. The resolution of a six-bit digital to Analog converter is

   (A) 20%

   (B) 10%

   (C) 1.58%

   (D) 0.12%

4. The Taylor series expansion of $3\sin x + 2\cos x$ is

   (A) $2 + 3x - x^2 - \frac{x^3}{2} + \ldots\ldots$

   (B) $2 - 3x + x^2 - \frac{x^3}{2} + \ldots\ldots$

   (C) $2 + 3x + x^2 + \frac{x^3}{2} + \ldots\ldots$

   (D) $2 - 3x - x^2 + \frac{x^3}{3} + \ldots\ldots$

5. To design a mod-10 asynchronous counter, the number of flipflops required is

   (A) 5

   (B) 4

   (C) 3

   (D) 2

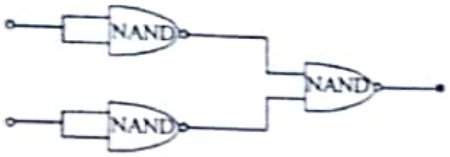
6. The 2's complement of 17 is

(A) 10 11 11

(B) 11 00 01

(C) 10 11 10

(D) 11 11 10

7. 

The above mentioned figure is equivalent to

(A) AND Gate

(B) OR Gate

(C) NOT Gate

(D) None of the above

8. When the initial slope of a sin wave is greater than the slew rate

(A) Distortion occurs

(B) Voltage gain is maximum

(C) Linear operation occurs

(D) The op-amp works best

9. When $\overline{A} + \overline{B}$ is expanded into minterms, it is expressed as

(A) $\Sigma m(0, 1, 2)$

(B) $\Sigma m(1, 3)$

(C) $\Sigma m(1, 1, 2)$

(D) $\Sigma m(1, 5, 2)$

10. A zener voltage regulator has load requirement of 12V and 2A. The zener diode minimum current requirement is 0.2A. The minimum voltage of input is 24V. What is the series resistance required with the source ?

(A) 6Ω

(B) 7·2Ω

(C) 5·45Ω

(D) 6·38Ω

11. The number of control lines required in a 32 to 1 multiplexer is

(A) 4

(B) 16

(C) 6

(D) 5

12. Let a data of 0101 is to be registered in a serial out shift register. After third clock pulse the register output read

(A) 0001

(B) 1010

(C) 1110

(D) 1111

13. A Y network has resistance of 10Ω each in two of its arms, while the third arm has a resistance of 11Ω. Its equivalent Δ network the lowest value of resistance among the three resistances is

(A) 29·09Ω

(B) 20Ω

(C) 10Ω

(D) 11Ω

14. Which of the following requires refreshing ?

(A) SRAM

(B) DRAM

(C) ROM

(D) EPROM

15. $AB + \bar{A}C + BC$ is equal to

(A) AB

(B) $A + C$

(C) $AB + \bar{A}C$

(D) $\bar{A} + B$

16. A flipflop is equivalent to a

(A) astable multivibrator

(B) monostable multivibrator

(C) bistable multivibrator

(D) None of these

17. The reactance of a capacitor is

(A) directly proportional to the frequency

(B) directly proportional to the square of frequency

(C) inversely proportional to the frequency

(D) inversely proportional to the square root of frequency

18. The time base of a CRO is developed by

(A) Square waveform

(B) Triangular waveform

(C) Sinusoidal waveform

(D) Sawtooth waveform

19. An 8 bit successive approximation analog to digital converter has full scale reading of 2·55 V and its conversion time for an analog input of 1 V is 20 μs. The conversion time for a 2 V input will be

(A) 10 μs

(B) 20 μs

(C) 40 μs

(D) 50 μs

20. A halfwave rectifier is equivalent to a

(A) clamper circuit

(B) zero crossing device

(C) integrator

(D) clipper circuit

21. When the input signal to an integrator is a square wave, the output will be

(A) Triangular wave

(B) Sine wave

(C) Square wave

(D) None of these

22. The pinch off voltage of a JFET is 5·0 Volt, it's cut-off voltage is

(A) $(5\cdot0)^{1/2}$

(B) 2·5V

(C) 5·0V

(D) $(5\cdot0)^{3/2}$ V

23. In a differentiator the feedback element is a

(A) registor

(B) capacitor

(C) inductor

(D) diode

24. Which one of the option is true ?

(A) $\overline{\overline{A} + \overline{B}} = \overline{A}.\overline{B}$

(B) $\overline{\overline{A} + \overline{B}} = A.B$

(C) $\overline{\overline{A} + \overline{B}} = A + B$

(D) $\overline{\overline{A} + \overline{B}} = \overline{A} + \overline{B}$

25. The electric and magnetic fields share the energy of an electromagnetic wave in the ratio

(A) 1 : 2

(B) 2 : 1

(C) 1 : 4

(D) 1 : 1

26. The displacement current arises due to

(A) positive charges only

(B) negative charges only

(C) both positive and negative charges

(D) time varying electric field

27. For a lossless transmission line the characteristic impedance is given by [Symbols used have their usual meaning]

(A) $Z_0 = \sqrt{\frac{R + jwL}{G + jwC}}$

(B) $Z_0 = \sqrt{\frac{L}{C}}$

(C) $Z_0 = \sqrt{\frac{C}{G}}$

(D) $Z_0 = \frac{L}{C}$

28. The Poynting theorem is a mathematical statement of the conservation of

(A) momentum

(B) charge

(C) electromagnetic energy

(D) states

29. The Fourier transform of a voltage signal x(t) is x(f). The unit of x(f) is

(A) Volt

(B) Volt-sec

(C) Volt/sec

(D) $(Volt)^2$

30. In an amplitude modulated system, if the total power is 600W and the power in the carrier is 400W, the modulation index is

(A) 0·5

(B) 0·75

(C) 0·9

(D) 1

31. At a conductor dielectric boundary, the electric field is always

(A) zero

(B) absent

(C) normal to the surface

(D) along the surface

32. For 8085 microprocessor, the assembly language instruction that stores the contents of H and L registers into the memory locations 2050H and 2051H respectively is

(A) SPHL 2050 H

(B) SPHL 2051 H

(C) STAX 2501H

(D) SHLD 2050 H

33. In a microprocessor, the register which holds the address of the next instruction to be fetched is

(A) accumulator

(B) program counter

(C) stack pointer

(D) instruction register

34. A linear time invariant system with an impulse response h(t) produces output y(t) when an input x(t) is applied. When the input $x(t-\mathcal{f})$ is applied to a system with impulse response $h(t-\mathcal{f})$, then output will be

(A) $y(\mathcal{f})$

(B) $y(2(t-\mathcal{f})$

(C) $y(t-\mathcal{f})$

(D) $y(t-2\mathcal{f})$

35. In amplitude modulation process, the amplitude is a

(A) constant

(B) zero

(C) variable

(D) time

36. In which of the following waveform, the mean value and rms value are equal ?

(A) square wave

(B) triangular wave

(C) sine wave

(D) sawtooth wave

37. Transmission lines when connected to antennas have

(A) capacititive load

(B) resistive load whose resistance is greater than the characteristic impedance of the line

(C) resistive load at the resonance frequency

(D) None of these

38. What is the most commonly used transmission line for high frequency application ?

(A) two-wire balanced line

(B) three-wire line

(C) single-wire line

(D) co-axial line

39. When operated in cut-off and saturation conditions, a transistor acts like a

(A) linear amplifier

(B) switch

(C) capacitor

(D) registor

40. In common emitter configuration of a transistor if the base emitter junction is open, the collector voltage is

(A) V_{cc}

(B) Zero

(C) Floating

(D) 0.2V

41. For an n type semiconductor, the Fermi level lies

(A) below the bottom of the conduction band

(B) above the bottom of the conduction band

(C) above the top of the valance band

(D) midway between top of valance band and bottom of conduction band

42. In a bipolar junction transistor, which of the following factor changes with temperature ?

(A) β

(B) V_{BE}

(C) I_{CO}

(D) All of the above

43. In a LED, light is emitted because of

(A) recombination of charge carriers

(B) diode gets heated up

(C) light falling on gets amplified

(D) light gets reflected

44. A 5 kW carrier wave is amplitude modulated to a modulation index 60%. The total power in the amplitude modulated wave is

(A) 3 kW

(B) 10 kW

(C) 5.9 kW

(D) 6 kW

45. A moving coil galvanometer is converted into a DC ammeter by connecting

(A) a low resistance parallel to galvanometer

(B) a high resistance in series

(C) an inductance in series

(D) a capacitor in parallel

46. For the input voltages of 200μV and 160μV, the output voltage obtained from an op-amp with differential gain 4000 and CMRR 150 is

(A) 16V

(B) 164.8 mV

(C) 64 mV

(D) 76 mV

47. A diode that has a negative resistance region is

(A) hot carrier diode

(B) tunnel diode

(C) LED

(D) Schottky diode

48. What is the approximate voltage drop of LED ?

(A) 0·3V

(B) 0·7V

(C) 1·5V

(D) 6V

49. In electromagnetic wave polarization is due to

(A) transverseness of wave

(B) high speed

(C) longitudinal character of the wave

(D) None of these

50. An antena behaves as a resonant circuit, only when its length is

(A) $\frac{\lambda}{3}$

(B) $\frac{\lambda}{4}$

(C) $\frac{\lambda}{6}$

(D) $\frac{\lambda}{2}$ or its integral multiple

51. A practical current source is represented by

(A) a resistance in series with an ideal current source

(B) a resistance in parallel with an ideal current source

(C) a resistance in series with an ideal voltage source

(D) a resistance in prarallel with an ideal voltage source

52. If $\vec{B}$ is magnetic induction vector then $\vec{\nabla} \cdot \vec{B}$ is equal is

(A) $\vec{E}$

(B) zero

(C) $\vec{\nabla} \times \vec{E}$

(D) $\frac{\partial \vec{E}}{\partial t}$

53. The phase angle difference between current and voltage in a circuit is 90°, then the power will be

(A) minimum and non zero

(B) maximum

(C) zero

(D) None of these

54. In a LR circuit,

(A) voltage leads current

(B) current leads voltage

(C) voltage and current are in phase

(D) there is no current

55. A circuit with a registor, inductor and capacitor is series resonant with frequency f_0 Hz. If all the component values are now doubled the new resonant frequency is

(A) $2f_0$

(B) remains unchanged

(C) $f_0/2$

(D) $f_0/4$

56. Fiber optic cables operates at frequencies near

(A) 20 MHz

(B) 200 MHz

(C) 2 GHz

(D) 800 THz

57. Which of the following device stores energy in terms of electric field?

(A) inductor

(B) registor

(C) motor

(D) capacitor

58. $(1111)_2 = ?$

(A) $(15)_{10}$

(B) $(28)_{10}$

(C) $(123)_8$

(D) None of these

59. A voltage follower has a gain

(A) infinite

(B) $\frac{1}{10}$

(C) 1

(D) $\frac{1}{e}$

60. The zero level detector is an application of a

(A) comparator

(B) differentiator

(C) diode

(D) integrator

(Space for rough work)